

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: William FORD et al.

U.S. Serial No.: Filed Concurrently Herewith

Title of Invention: SELECTIVE METALLISATION OF NUCLEIC ACIDS
VIA METAL NANOPARTICLES PRODUCED IN-SITU

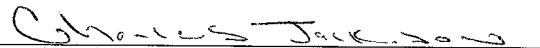
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PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Box Patent Application (35 U.S.C. 111)
Washington, D.C. 20231

Sir:

Before the issuance of the first Office Action, please amend the above-identified application as follows:

IN THE CLAIMS:

Please amend claims 3-9, 11-14, 16-18, 20 and 23 as follows:

3. (Amended) A process according to claim 1, characterized in that the nucleic acid is selected from the group comprising DNA, RNA, PNA, CNA, obligonucleotides,

oligonucleotides of DNA, oligonucleotides of RNA, primers, A-DNA, B-DNA, Z-DNA, polynucleotides of DNA, polynucleotides of RNA, T-junctions of nucleic acids, triplexes of nucleic acids, quadruplexes of nucleic acids, domains of non-nucleic acid polymer-nucleic acid block-copolymers and combinations thereof.

4. (Amended) A process according to claim 1, characterized in that the nucleic acid is double-stranded or single-stranded.

5. (Amended) A process according to claim 1, characterized in that the metal complex-nucleic acid conjugate is formed by metalation and/or interactive ligand binding.

6. (Amended) A process according to claim 1, characterized in that specific bases of the nucleic acid are metalated.

7. (Amended) A process according to claim 1, characterized in that the nucleic acid specific metal complex is selected from the group comprising dichloro(2,2':6',2''terpyridine)platinum(II), cis-diaminodichloroplatinum(II) and metal complexes with attached or integrated nucleic acid interacting groups, like intercalating, groove binding and alkylating agents.

8. (Amended) A process according to claim 1, characterized in that the metal complex-nucleic acid conjugate is separated from non-conjugated metal complex and/or non-conjugated by-products by chromatography, e.g. gel filtration or ion exchange, precipitation, e.g. ethanol precipitation or rinsing, e.g. with water or an aqueous salt solution.

9. (Amended) A process according to claim 1, characterized in that the metal complex-nucleic acid conjugate is reacted with at least one reducing agent selected from the group comprising boron hydrides, borohydride salts, Lewis base:borane complexes of the general formula $L:BH_3$, in which L can be amine, ether, phosphine or sulfide, hydrazine and derivatives, hydroxylamine and derivatives, hypophosphite salts, formate salts, dithionite salts and H_2 .

11. (Amended) A process according to claim 1, characterized in that the metal nanoparticle comprises at least one metal selected from the group of Fe, Co, Ni, Cu, Ru, Rh, Pd, Ag, Os, Ir, Pt, Au or combinations (e.g. alloys) of these metals.
12. (Amended) A process according to claim 1, characterized in that the metal nanoparticle is catalytically active towards electroless metallisation.
13. (Amended) A process according to claim 1, characterized in that the metal nanoparticle can not be visualized by atomic force microscopy and/or that the diameter of the metal nanoparticle is smaller than 3nm.
14. (Amended) A process according to claim 1, further comprising the step of treating the metal nanoparticles within the metal nanoparticle-nucleic acid composite with an electroless plating solution in order to enlarge the metal nanoparticles.
16. (Amended) A process according to claim 14, characterized in that the metal nanoparticles are treated with an electroless plating solution comprising at least one of the metals selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Ag, Pt, Au or combinations (e.g. alloys) of these metals.
17. (Amended) A process according to claim 14, characterized in that the metal nanoparticles are treated with an electroless plating solution comprising at least one of the metals selected from the group comprising magnetic and/or magnetized Fe, Co, Ni, or combinations (e.g. alloys) of these metals or combinations (e.g. alloys) of these metals with B or P.
18. (Amended) A metal nanoparticle-nucleic acid composite obtainable according to a method of claim 1.
20. (Amended) A process for the manufacture of a nanowire, characterized by the following steps:

providing a metal nanoparticle-nucleic acid composite according to claim 18 and growth, preferably controlled growth, of the nanoparticle by electroless deposition of a metal according to claim 16.

23. (Amended) Use of the process according to claim 1 for the selective metallisation of a nucleic acid.

Please add the following new claim:

24. (New) A process for the manufacture of a nanowire, characterized by the following steps: providing a metal nanoparticle-nucleic acid composite according to claim 18 and growth, preferably controlled growth, of the nanoparticle by electroless deposition of a metal according to claim 17.

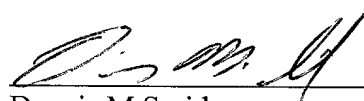
REMARKS

Claims 1-24 are in the application. Claims 3-9, 11-14, 16-18, 20 and 23 have been amended to eliminate multiple dependencies. New claim 18 has been added. Attached hereto is a marked up version of the changes made to claims 3-9, 11-14, 16-18, 20 and 23 by the current amendment. The attached page is captioned **"Version with markings to show changes made."** The filing fee has been calculated based upon these amendments to the claims.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**In the claims:**

3. (Amended) A process according to claim 1 ~~claims 1 or 2~~, characterized in that the nucleic acid is selected from the group comprising DNA, RNA, PNA, CNA, oligonucleotides, oligonucleotides of DNA, oligonucleotides of RNA, primers, A-DNA, B-DNA, Z-DNA, polynucleotides of DNA, polynucleotides of RNA, T-junctions of nucleic acids, triplexes of nucleic acids, quadruplexes of nucleic acids, domains of non-nucleic acid polymer-nucleic acid block-copolymers and combinations thereof.
4. (Amended) A process according to claim 1 ~~any of claims 1 to 3~~, characterized in that the nucleic acid is double-stranded or single-stranded.
5. (Amended) A process according to claim 1 ~~any of claims 1 to 4~~, characterized in that the metal complex-nucleic acid conjugate is formed by metalation and/or interactive ligand binding.
6. (Amended) A process according to claim 1 ~~any of claims 1 to 5~~, characterized in that specific bases of the nucleic acid are metalated.
7. (Amended) A process according to claim 1 ~~any of claims 1 to 6~~, characterized in that the nucleic acid specific metal complex is selected from the group comprising dichloro(2,2':6',2''-terpyridine)platinum(II), cis-diaminodichloroplatinum(II) and metal complexes with attached or intergrated nucleic acid interacting groups, like intercalating, groove binding and alkylating agents.
8. (Amended) A process according to claim 1 ~~any of claims 1 to 7~~, characterized in that the metal complex-nucleic acid conjugate is separated from non-conjugated metal complex and/or non-conjugated by-products by chromatograpy, e.g. gel filtration or ion exchange, precipitation, e.g. ethanol precipitation or rinsing, e.g. with water or an aqueous salt solution.

9. (Amended) A process according to claim 1 ~~any of claims 1 to 7~~, characterized in that the metal complex-nucleic acid conjugate is reacted with at least one reducing agent selected from the group comprising boron hydrides, borohydride salts, Lewis base:borane complexes of the general formula $L:BH_3$, in which L can be amine, ether, phosphine or sulfide, hydrazine and derivatives, hydroxylamine and derivatives, hypophosphite salts, formate salts, dithionite salts and H_2 .

11. (Amended) A process according to claim 1 ~~any of claims 1 to 10~~, characterized in that the metal nanoparticle comprises at least one metal selected from the group of Fe, Co, Ni, Cu, Ru, Rh, Pd, Ag, Os, Ir, Pt, Au or combinations (e.g. alloys) of these metals.

12. (Amended) A process according to claim 1 ~~any of claims 1 to 11~~, characterized in that the metal nanoparticle is catalytically active towards electroless metallisation.

13. (Amended) A process according to claim 1 ~~any of claims 1 to 12~~, characterized in that the metal nanoparticle can not be visualized by atomic force microscopy and/or that the diameter of the metal nanoparticle is smaller than 3nm.

14. (Amended) A process according to claim 1 ~~any of claims 1 to 13~~, further comprising the step of treating the metal nanoparticles within the metal nanoparticle-nucleic acid composite with an electroless plating solution in order to enlarge the metal nanoparticles.

16. (Amended) A process according to claim 14 ~~or 15~~, characterized in that the metal nanoparticles are treated with an electroless plating solution comprising at least one of the metals selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Ag, Pt, Au or combinations (e.g. alloys) of these metals.

17. (Amended) A process according to claim 14 ~~or 15~~, characterized in that

the metal nanoparticles are treated with an electroless plating solution comprising at least one of the metals selected from the group comprising magnetic and/or magnetized Fe, Co, Ni, or combinations (e.g. alloys) of these metals or combinations (e.g. alloys) of these metals with B or P.

18. (Amended) A metal nanoparticle-nucleic acid composite obtainable according to a method of claim 1 ~~any of claims 1 to 13~~.

20. (Amended) A process for the manufacture of a nanowire, characterized by the following steps:

providing a metal nanoparticle-nucleic acid composite according to claim 18 ~~or 19~~ and growth, preferably controlled growth, of the nanoparticle by electroless deposition of a metal according to claim 16 ~~any of claims 16 or 17~~.

23. (Amended) Use of the process according to claim 1 ~~any of claims 1 to 17~~ for the selective metallisation of a nucleic acid.